IN THE ABSTRACT OF THE DISCLOSURE

A semiconductor device with p-channel and n-channel field effect devices formed on a common substrate, having a silicon substrate with p-channel and n-channel field effect regions corresponding to said p-channel and n-channel field effect devices, respectively, and wherein: the n-channel field effect region has a silicon-germanium buffer layer on the substrate, a silicon-germanium compound relax layer on the buffer layer, a first silicon layer formed on the relax layer and a second silicon epitaxial layer formed on the first silicon layer, a concentration of germanium in the buffer layer being graduated so that it increases proceeding from a substrate side of the buffer layer to a relax layer side of the buffer layer, a concentration of germanium in the relax layer being substantially the same as the concentration of germanium at the relax layer side of the buffer layer, the p-channel field effect region has a silicon-germanium compound layer formed on the substrate and a silicon cap layer formed on the silicon-germanium compound layer, drain and source regions of the n-channel field effect device being within the second silicon epitaxial layer formed on the first silicon layer and the first silicon layer on the relax layer, and drain and source regions of the p-channel field effect device being within the silicon-germanium compound layer formed on the substrate and the silicon cap layer formed on the silicon-germanium compound layer.

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ABSTRACT OF THE DISCLOSURE

Disclosed is a semiconductor device capable of increasing the operational speed and reducing the power consumption. The semiconductor device includes an n-channel field effect transistor and a p-channel field effect transistor which are provided on a common base-substrate. A surface region, in which the n-channel field effect transistor is provided, of the base-substrate includes: a silicon substrate; a buffer layer formed on the silicon substrate, the buffer layer being made from a silicon-germanium compound having a germanium concentration gradually increased toward an upper surface of the buffer layer; a relax layer formed on the buffer layer, the relax layer being made from a silicon-germanium compound having a germanium concentration nearly equal to that of a surface portion of the buffer layer; and a silicon layer formed on the relax layer. Source/drain regions are formed in the silicon layer. A surface region, on which the p-channel field effect transistor is provided, of the base-substrate, includes: the silicon substrate; a silicon-germanium compound layer formed on the silicon substrate; and a cap layer formed on the silicon-germanium compound layer, the cap layer being made from silicon.

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